



Radiology &

Biomedical

Engineering

Departments

Columbia University

Multidisciplinary Imaging Research

Philip O. Alderson, M.D.

James Picker Professor & Chairman, Department of Radiology

Columbia University, College of Physicians and Surgeons

Columbia Presbyterian Medical Center, New York Presbyterian Hospital

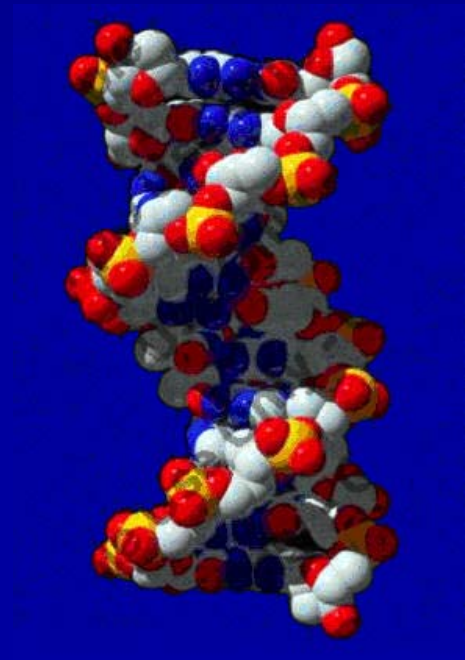
Multidisciplinary Imaging Research

- Why is it needed?
- What are the barriers?
- How to make it happen?



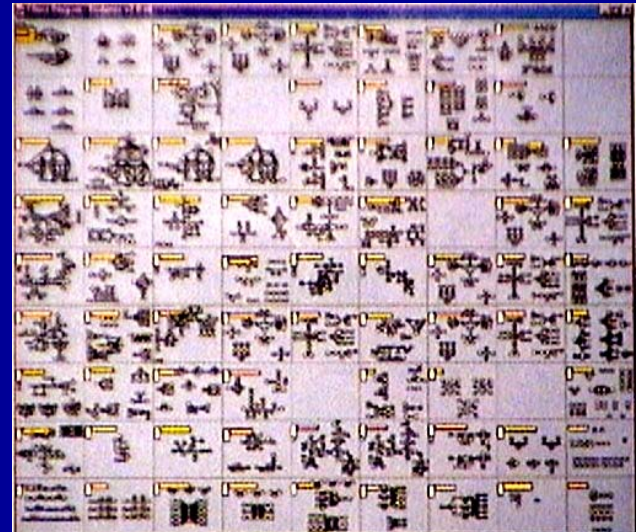
Revolutionary Era in Bioscience

- Molecular Biology
- Computer Science
- Imaging Technology
- Nanotechnology



The “New” Imaging Research

- Intricate methodologies
- Large data sets
- Quantitative bio-models
- Integrative paradigm



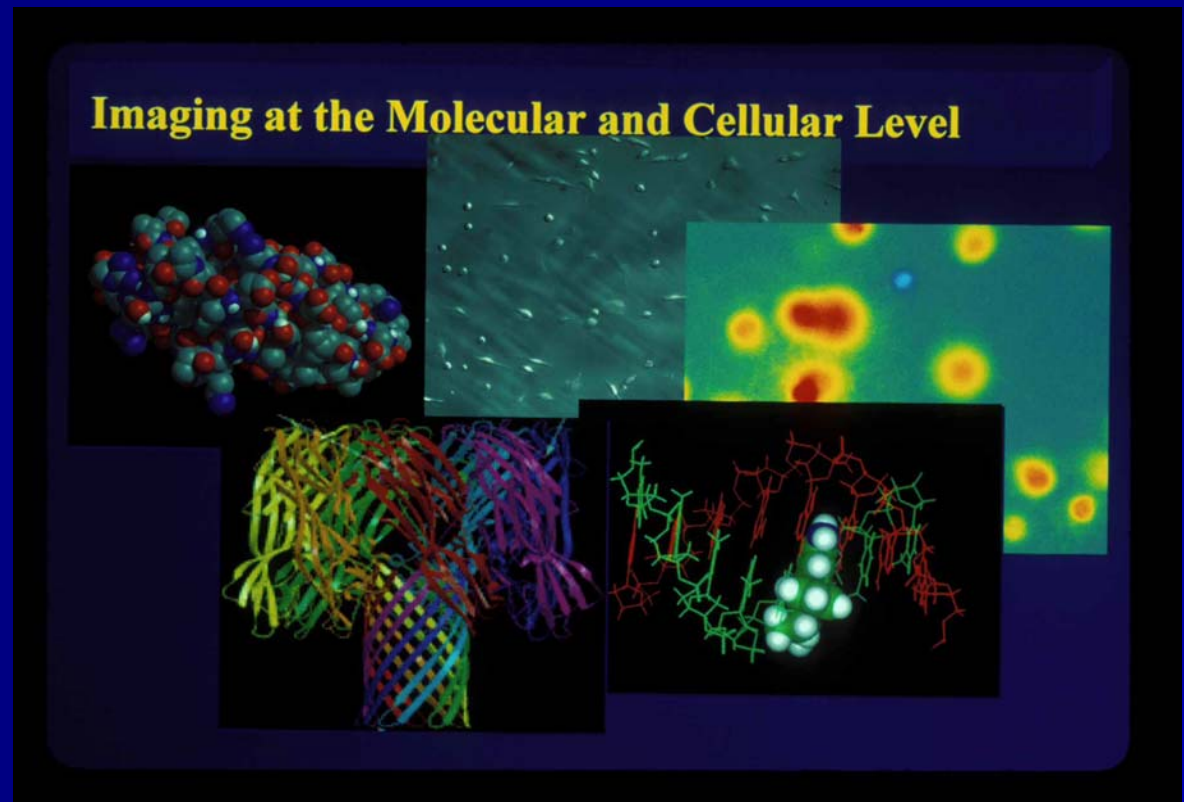
Goals for Imaging Research

- Develop quantitative approaches
- Validate / reproduce applications
- Share results / accelerate progress
- Translate to bedside



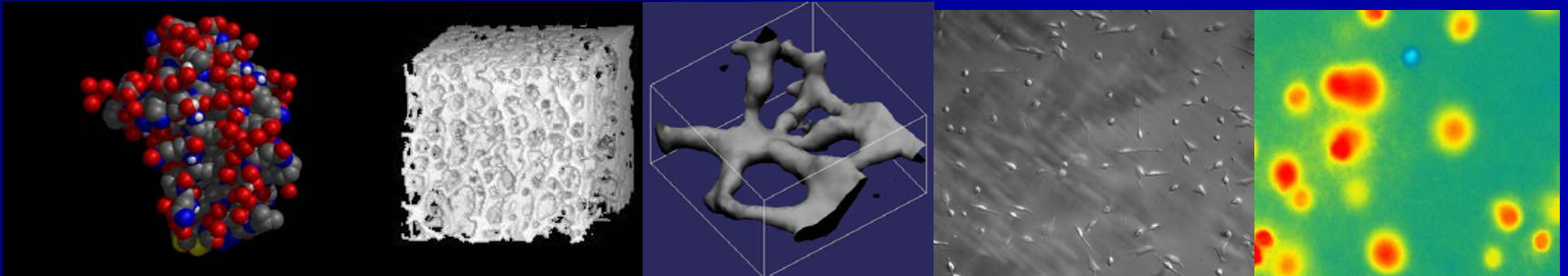
Biomedical Imaging Research

- New targets
- New tools
- New teams



Imaging Research

- New Targets
 - Reporter genes
 - Proteins / enzymes
 - Cell signaling
 - Diagnosis / drug development



Imaging Research

- New Tools
 - Micro PET / CT, MR microscopy
 - Optical imaging
 - Biosensors, Cryo-ET
 - Biochemically targeted ligands



Imaging Research

- New Teams
 - Molecular / cell biologists
 - Biomedical engineers
 - Physicists
 - Informatics
 - Pharmacologists
 - Physicians / Radiologists



Barriers to Team Research in Imaging

- Poor research infrastructure
- Organization of research resources
- Lack of funding incentives



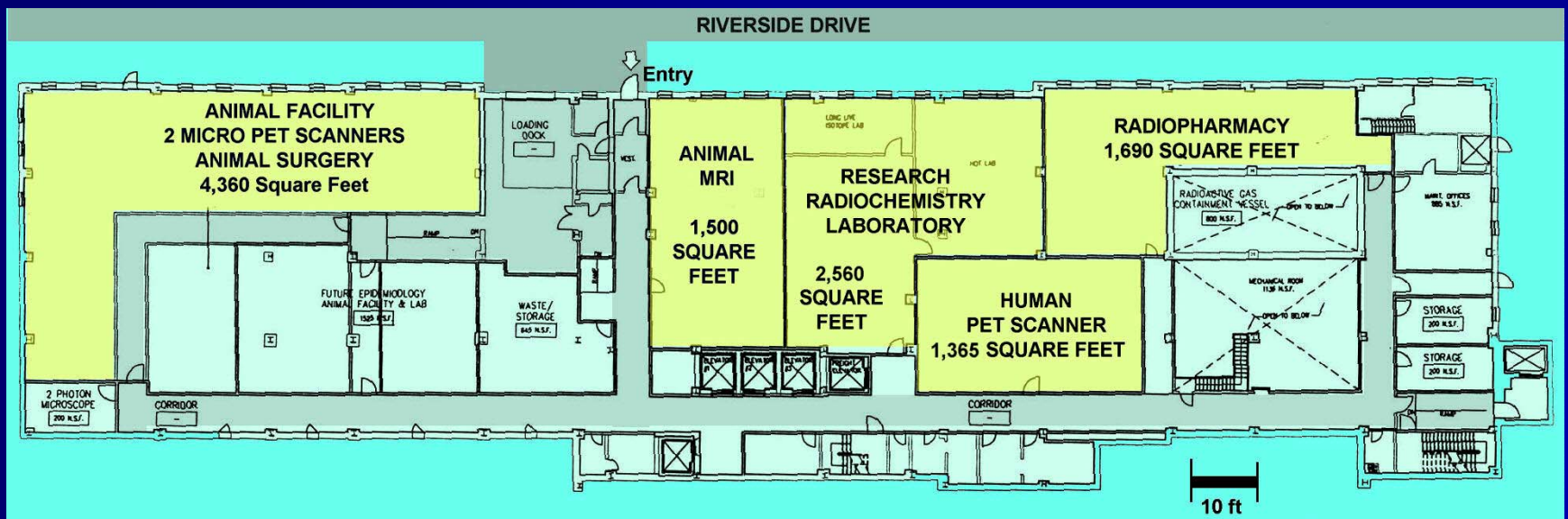
Promoting Team Research in Imaging

- Develop academic research infrastructure
- Re-align research incentives
 - More “research partnerships”
 - Allocate credit based on effort
- Advocate cross-cutting research to all



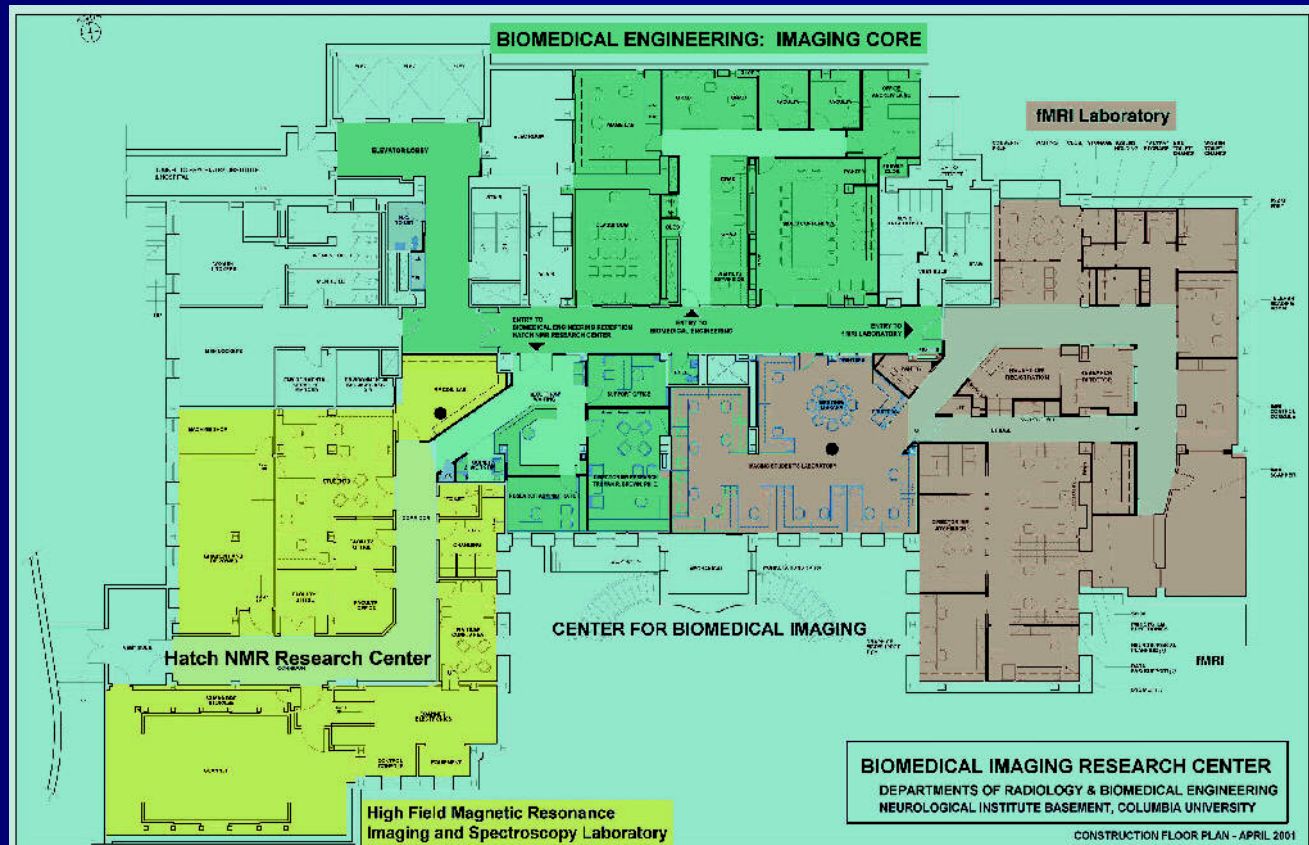
Columbia Integrated Imaging Center

- A New York State Science, Technology and Academic Research Center at Columbia



Imaging Research Centers

- Neurological Institute Basement



Imaging Research Centers

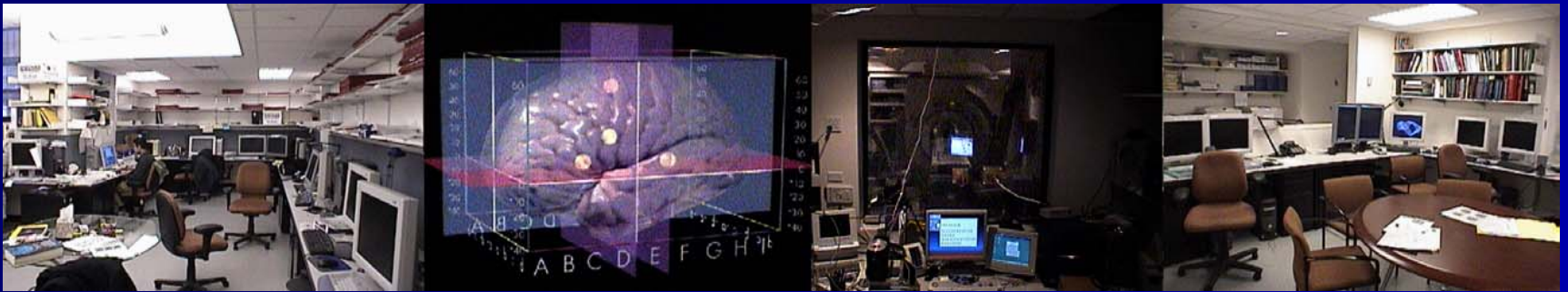
- Hatch MR Center
 - Truman Brown, Director Magnetic Resonance Research



Oncology – Cardiology – Neurology - Genomics – Spectroscopy – High Field Research

Imaging Research Centers

- fMRI Research Center
 - Joy Hirsch, Director Functional MR



Neurosurgery – Neurology - Interventional – Psychiatry – Informatics – Translational Research

Imaging Research Centers

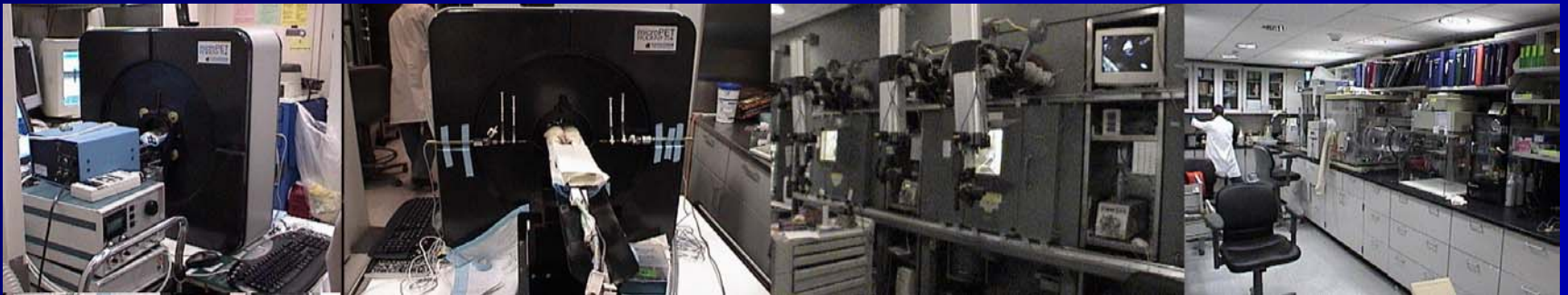
- Biomedical Engineering Imaging Research Center
 - A Whitaker Foundation Development Award Site
 - Andrew Laine, Vice Chair, Biomedical Engineering



Image Informatics – Mammography – Ultrasound – Magnetic Resonance – Education

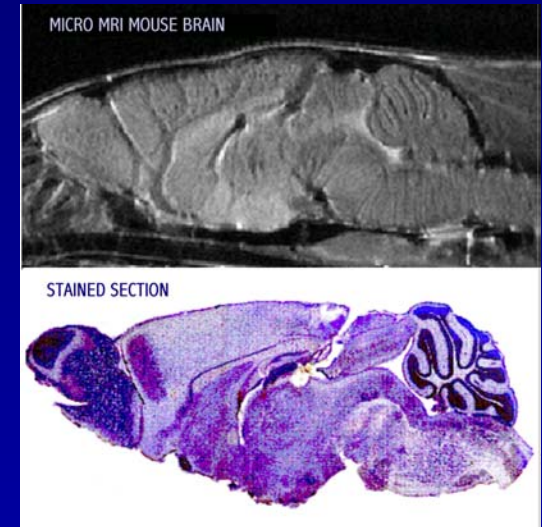
Shared Research Resources

- Micro PET
- Cyclotron
- Ligand radioisotope laboratory



Shared Research Resources

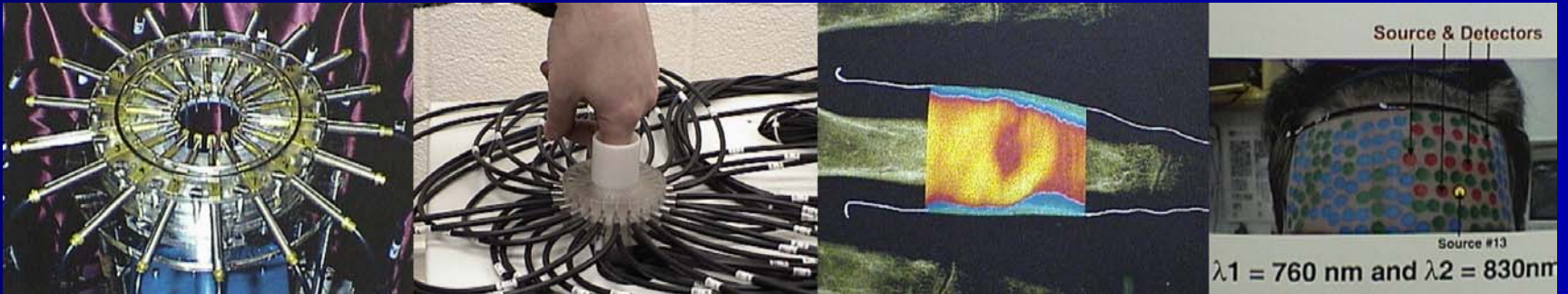
- MR Microscopy (9 Tesla)



Gated Mouse Heart

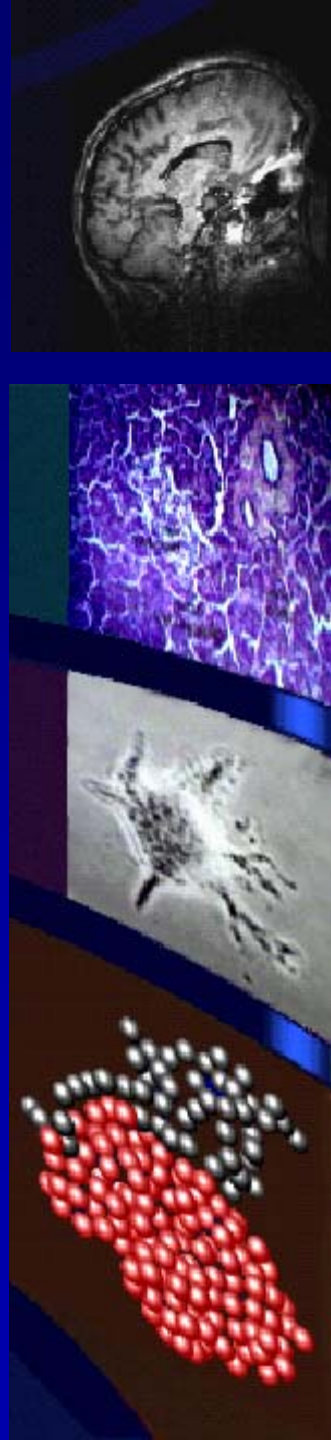
Shared Research Resources

- Optical imaging

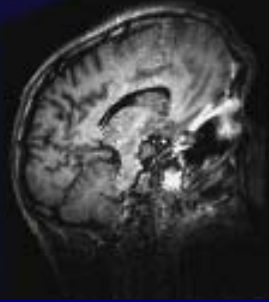


Imaging in Multidisciplinary Research

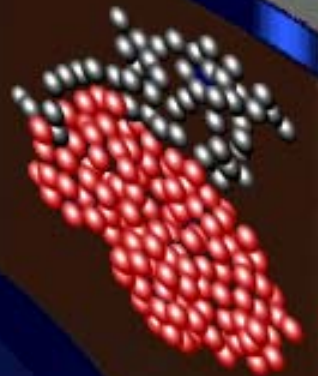
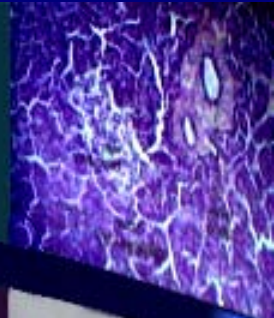
- Core resource
- Scales across many domains
- Facilitates progress / understanding
- Translates basics to bedside



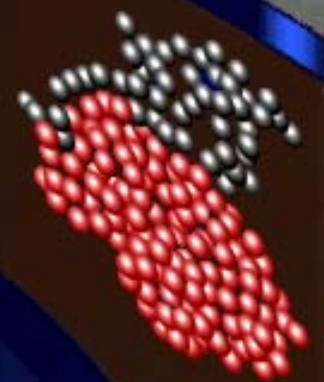
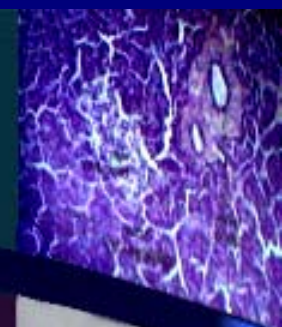
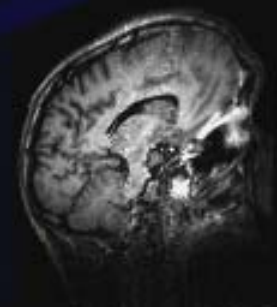
Future Research Initiatives



- Research infrastructure awards
- Training grants
- Multi-Institute research
- Multi-departmental research
- Multi-institutional research



Columbia University



Columbia University